Please add the following new claims.

29. (New) A supramolecular nanosystem comprising:

a first oligomer comprising pentopyranose monomers;

a second oligomer comprising pentopyranose monomers, wherein the second oligomer is capable of pairing non-covalently with the first oligomer; and

a functional unit coupled to the second oligomer, wherein the functional unit is selected from the group consisting of amino acids, peptides, fluorophores having an amine, chromophores having an amine, metals, redox centers, and chelating agents.

30. (New) The supramolecular nanosystem of claim 29, wherein the second oligomer further comprises at least one nucleobase, and wherein the functional unit is coupled to the nucleobase.

31. (New) The supramolecular nanosystem of claim 29, wherein the functional unit is coupled directly to a pentopyranose monomer of the second oligomer.

32. (New) The supramolecular nanosystem of claim 29, wherein the functional unit comprises a metal, and wherein the second oligomer further comprises at least one nucleobase, and wherein the metal binds to the at least one nucleobase.

33. (New) The supramolecular nanosystem of claim 30, wherein the functional unit is a chelating agent.

34. (New) The supramolecular nanosystem of claim 33, further comprising a metal, wherein the metal is bound to the chelating agent.

35. (New) The supramolecular nanosystem of claim 34, further comprising a second chelating agent coupled to the first oligomer, wherein the second chelating agent is bound to the metal.

E1 cont.

36. (New) The supramolecular nanosystem of claim 35, wherein the metal is gold (Au).

37. (New) The supramolecular nanosystem of claim 36, wherein the chelating agent comprises a maleimido moiety.

38. (New) The supramolecular nanosystem of claim 34, wherein the metal is nickel (Ni).

39. (New) The supramolecular nanosystem of claim 29, wherein the functional unit comprises a redox center, wherein the second oligomer further comprises at least one nucleobase, and wherein the redox center binds to the at least one nucleobase.

40. (New) The supramolecular nanosystem of claim 39, wherein the redox center is one of an electron donor or an electron acceptor.

41. (New) The supramolecular nanosystem of claim 40, wherein the redox center is selected from the group consisting of a quinone and hydroquinone.

42. (New) The supramolecular nanosystem of claim 29, wherein the first oligomer forms a hairpin loop.

43. (New) The supramolecular nanosystem of claim 29, wherein the pentopyranose monomers are selected from the group consisting of a ribose, arabinose, lyxose, and xylose.

44. (New) The supramolecular nanosystem of claim 29, wherein the pentopyranose monomers have the D configuration.

45. (New) The supramolecular nanosystem of claim 29, wherein the pentopyranose monomers have the L configuration.

46. (New) The supramolecular nanosystem of claim 29, wherein the first oligomer is longer than the second oligomer.

47. (New) The supramolecular nanosystem of claim 29, wherein the length of the first oligomer is between about 10 and 500 monomer units.

48. (New) The supramolecular nanosystem of claim 29, wherein the length of the first oligomer is between about 10 and 100 monomer units.

49. (New) The supramolecular nanosystem of claim 29, wherein the length of the second oligomer is between about 4 and 50 monomer units.

50. (New) The supramolecular nanosystem of claim 29, wherein the length of the second oligomer is between about 4 and 25 monomer units.

51. (New) The supramolecular nanosystem of claim 29, wherein the length of the second oligomer is between about 4 and 15 monomer units.

52. (New) The supramolecular nanosystem of claim 29, wherein the length of the second oligomer is between about 4 and 8 monomer units.

53. (New) The supramolecular nanosystem of claim 29, wherein the first oligomer further comprises at least one nucleobase selected from the group consisting of adenine, guanidine, isoguanidine, cytosine, thymine, uracil, 2,6-diaminopurine, and xanthine.

54. (New) The supramolecular nanosystem of claim 29, wherein the second oligomer further comprises at least one nucleobase selected from the group consisting of adenine, guanidine, isoguanidine, cytosine, thymidine, uracil, 2,6-diaminopurine, and xanthine.

55. (New) The supramolecular nanosystem of claim 29, wherein the first oligomer is linked to the second oligomer after pairing by a coupling reaction selected from the group consisting of covalent crosslinking, metathesis, Heck coupling, Michael addition, and oxidation reactions.

56. (New) The supramolecular nanosystem of claim 29, further comprising a third oligomer comprising pentopyranose monomers, wherein the third oligomer is capable of pairing non-covalently with the first oligomer, and wherein the third oligomer is not capable of pairing non-covalently with the second oligomer.

E1 cont.

57. (New) The supramolecular nanosystem of claim 56, wherein the third oligomer is different than the second oligomer, and wherein the third oligomer is not capable of pairing non-covalently with the second oligomer.

58. (New) The supramolecular nanosystem of claim 56, wherein the third oligomer is the same as the second oligomer, and wherein the third oligomer is not capable of pairing non-covalently with the second oligomer.

59. (New) The supramolecular nanosystem of claim 29, further comprising a second functional unit coupled to the second oligomer, wherein the functional unit is selected from the group consisting of amino acids, peptides, fluorophores having an amine, chromophores having an amine, metals, redox centers, and chelating agents.

60. (New) The supramolecular nanosystem of claim 29, wherein the functional unit is a chelating agent, and wherein the chelating agent is coupled directly to the pentopyranose monomer of the second oligomer.

61. (New) The supramolecular nanosystem of claim 29, wherein the pentopyranose monomers are connected by a linkage selected from the group consisting of thiophosphate, alkylated phosphate, phosphonate, and amide.

62. (New) The supramolecular nanosystem of claim 29, wherein the chromophore is azobenzene.